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SEVERE SYSTEMIC SARCOIDOSIS WITH ASCITES AND SPLENOMEGALY*

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In the past four years, a patient with extensive Boeck's sarcoid has been observed at the Memorial Hospital. Because she has such a widespread picture of sarcoidosis and has had operative intervention for symptomatic relief, her case presents an unusual opportunity for study.

The disease now generally known as Boeck's sarcoid has been recognized only within the last eighty years (6). First the cutaneous manifestations were pointed out. Later, different observers described lymph node involvement, the uveoparotid syndrome, the pulmonary picture, and bone invasion, describing them as independent entities. In 1914, Schaumann suggested that these apparently unrelated syndromes were part of the same disease. He noted involvement of the skin, mucous membranes, lymph nodes, tonsils, liver, spleen, bone marrow, and lungs. Since then, many reports about Boeck's sarcoid have been written. Each one, however, usually emphasizes only one aspect of the disease. The excellent general articles in the American journals by Longcope (10), Harrell (5), and Reisner (17) cover the subject so adequately that no attempt is being made here to review the literature completely, but the following brief summary will strive to consolidate the information about sarcoidosis as a systemic disease.

The etiology and pathogenesis of systemic sarcoidosis are still unknown despite extensive studies by numerous investigators, including Williams and Nickerson (23), Schaumann (20), Harrell (5), Olitsky and Harford (15), Sabin, Doan and Forkner (19).

Indeed, the last two groups of investigators have shown that epitheloid reactions similar to those of Boeck's sarcoid can be elicited from such inert substances as lecithin, aluminum hydroxide, and the wax derivatives of blastomycetes or tubercle bacilli. Longcope (10),

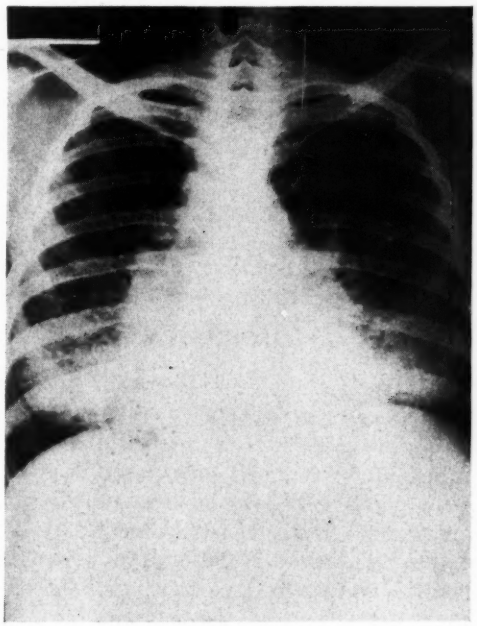

Fig. 1.

emphatically states that the disease is not caused by the human, bovine, or avian tubercle bacilli and that it bears no relationship to the virus of lymphogranuloma venereum or the Leishman-Donovan bodies of kala-azar, two diseases which, like Boeck's sarcoid, clinically show an elevated plasma globulin.

Harrell (5), has suggested that perhaps Boeck's sarcoid represents an exaggerated allergic response of epithelioid cells to a small amount of a lipid fraction of a single organism or a variety of organisms, analogous to the

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necrosis, polymorphonuclear neutrophilic infiltration, and edema of the familiar allergic response to proteins.

It is interesting that Boeck's sarcoid has been reported as occurring in association with acquired hemolytic anemia (2) and idiopathic thrombocytopenic purpura (14,21). One group of authors (14) points out that in their one case of purpura, it should probably be classified as secondary to sarcoidosis of the spleen; but they also point out that the relationship of purpura hemorrhagica to sarcoid disease of the spleen is not certain.

Sarcoidosis has been reported (7) in one instance as the responsible disease provoking spontaneous rupture of the spleen. The disease was pictured involving the intimal surfaces of the smaller splenic veins with resultant focal hemorrhages and subsequent rupture.

Because of the splenomegaly, hepatomegaly and moderate anemia which is occasionally seen in cases of Boeck's sarcoid, spleens have been removed (10,13) from patients having the pre-operative diagnosis of Banti's disease, only to find on histological examination of the spleen that Boeck's sarcoid was the true cause of the splenomegaly.

The typical pathological lesion of Boeck's sarcoid is a tuberculoid one, consisting of microscopic collections of large pale staining epithelioid cells, which may form discrete, closely packed masses approximating the size of miliary tubercles. They lack the peripheral zone of lymphocytes and central areas of caseation necrosis of true tubercles. No tubercle bacilli can be demonstrated in the lesions. Giant cells of the Langhan's type may be present as well as larger giant cells containing the peculiar asteroid bodies so well described by Friedman (4). Small central areas of epithelioid cellular degeneration and so-called fibrinoid necrosis are occasionally apparent in the lesions. These lesions are usually the same microscopically no matter in which organ or tissue in the body they occur. They have been reported (17) as having occurred in almost every tissue of the body with the exception of ovary and fallopian tube.

Boeck's sarcoid is most often noted in people between fifteen and forty-five years. However, ages have ranged from a few months to sixty years. It is difficult to determine the onset, according to Reisner (17), because the visceral manifestations which are usually first may not be noted for months or years. The incidence is about equal for males and females, but is higher for Negroes than for whites.

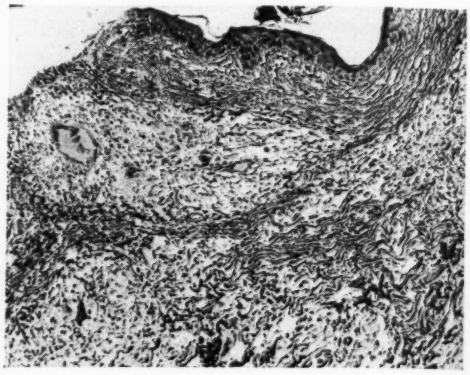

Fig. 2 (x115) Boeck's sarcoid of skin. Four ill-defined tuberculoid lesions are present in stratum corium. Note large Langhan's giant cell.

Symptoms vary with the anatomical extent of the disease. Not only will the signs and symptoms differ from patient to patient, but in the same patient from time to time. For example, what may at first appear to be a localized swelling of the lacrimal glands may prove to be the precursor of more widespread Boeck's sarcoid. Therefore, the disease is difficult to classify. Authors disagree on the occurrence of such general symptoms as weight loss, fever, joint pains, and fatigue, especially at the onset of the disease or in its reactivation. Symptoms are caused primarily by mechanical interference with organic function, rather than by any form of systemic intoxication. Fever is uncommon.

Various syndromes such as atypical tuberculous splenomegaly, Mikulicz's syndrome, Heerfordt's syndrome, and lupus pernio of Besnier have frequently been described as caused by Boeck's sarcoid. Mikulicz's syndrome consists of lacrimal, submaxillary, and parotid swelling, which may be related to eye signs and may be associated with cervical lymph nodes.

Heerfordt's syndrome is described as uveoparotid fever with puffiness of the eyelids, failing vision, facial paralysis, and parotid enlargement. Lupus pernio of Besnier produces an appearance somewhat similar to

leprosy with enlarged lymph nodes, lesions on the ears, knotty swellings of finger and toe joints with "desposits" in the phalangeal joints (10).

Involvement of the eye and its accompanying structures is common. It appears in 25 to 50% of the cases and can be the first manifestation. Seven of Longcope's (10), sixteen cases with eye signs had uveoparotid fever. The conjunctive, selera, uveal tract, retina, and choroid may be involved separately or together. There is frequent iridocyclitis which

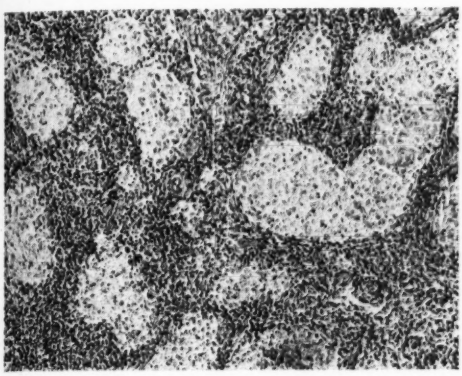

Fig. 3 (x115) Boeck's sarcoid of lymph node. Note classical lesions without giant cells or caseation necrosis.

may slowly heal, ending in blindness. Retrobulbar neuritis may also occur and result in blindness.

Skin manifestations have been well reported in the dermatological literature. They occur in about half of the cases. The lesions are usually described as purplish raised areas. Reisner (17) divides them into three types: large nodular, discrete nodular, and diffuse, infiltrating plaque-like lesions. There may be a combination of the three varieties. Distribution is usually symmetrical and disseminated, but may be localized. The lesions are commonly on the extensor surfaces of the upper and lower extremities, the nose, cheek, chest, abdomen, eyelids (especially along the margins), and the ears. Healing may occur with or without scarring. Some cases resemble lupus vulgaris and some have been reported as progressing into lupus or tuberculosis of the skin.

Lymph nodes are the most frequently involved, often in a very widespread manner. In one report (17), half of the cases had diseased lymph nodes as the only or the most conspicuous overt finding. Often, lymph nodes which have seemed insignificant clinically have been shown by biopsy to have sarcoidosis. Cervical, axillary, and inguinal involvement is most common, and is usually bilateral. However, the lymph nodes may be localized to the mediastinum or abdomen. The lymph nodes are usually small to moderate in size, but they may be very large. In one case (10), a thirteen year old boy was explored for abdominal tumors which were found to consist of huge

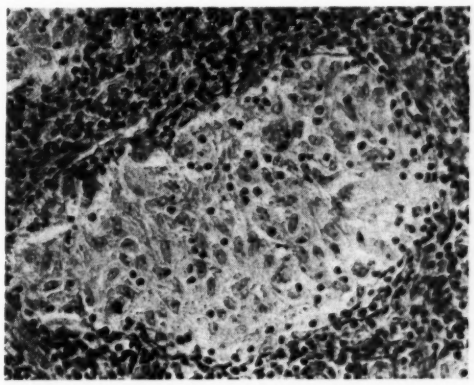

Fig. 4 (x345) Boeck's sarcoid of lymph node. High power, showing a group of reticulo-endothelial epithelioid cells making up the typical lesion.

abdominal sarcoidal lymph nodes. In the majority of cases, lymphadenopathy is combined with evidence of pulmonary disease, but the course of lymph node enlargement is independent of the course of other organ involvement.

Pulmonary manifestations are most often noted by x-ray, often without any symptoms. Moderate dyspnea is not uncommon. This may be as much a result of intrathoracic lymph node enlargement due to sarcoidosis as of actual pulmonary involvement. In some cases, dyspnea had been related to myocardial invasion. Twenty-four of Oppenheim's (16) chest cases had one or more of the following symptoms: cough, dyspnea, malaise, chest pain, fever, and weight loss. Cough was most prominent. Physical examination of the chest is usually negative. X-ray findings are variable with different patients and even with the same patient in various stages of the disease. There is a predilection for the mid-zones, and the

findings are usually bilateral. There are three representative types (17). The first, diffuse disseminated, is similar to miliary tuberculosis. It is found in one-third of the cases and in some is the earliest manifestation of the disease. The second, diffuse, with local changes of linear character, may be combined with the nodular type, and may resemble silicosis, vascular congestion, lymphangitis, or carcinomatosis. The third consists of patchy coalescent densities having the appearance of conglomerate fibrotic induration. It resembles chronic tuberculosis of the productive and fibrotic type. A changing x-ray picture in the late stages is due to varying degrees of fibrosis of the lung, with contraction of the lung fields and secondary bronchiectasis or areas of emphysema.

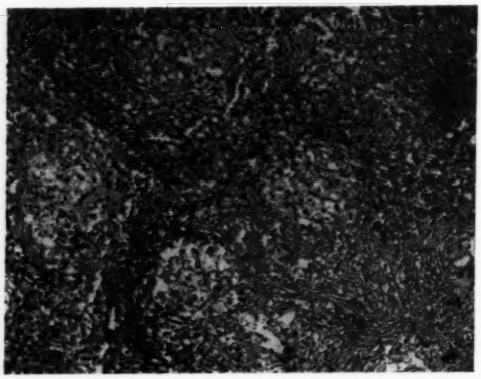

Fig. 5 (x115) Boeck's sarcoid of spleen. Note six ill-defined lesions of sarcoid.

The characteristic circumscribed punched-out cystic bone changes are pathognomonic, but they are found in relatively few cases. There may also be diffuse rarefaction and occasional marked mutilation of bone. Slight bone pain is occasionally noted in early cases.

Osseous changes take place in a higher percentage of those with skin disease than those with sarcoidosis in other organs. Bone marrow invasion has been observed in special studies or at autopsy where the degree of involvement is not marked enough to produce x-ray changes. (22)

Nickerson's (13) necropsy findings suggest that the liver is much more frequently involved than is suspected clinically. The liver was palpable in about one-third of several series of cases (5, 10, 17). Reisner (17) felt that liver enlargement was more likely to be noted in early cases. Evidence of cirrhosis has rarely been reported. Little note has been made of impaired liver function unless the increased serum globulin fraction is so considered (5).

The spleen is not uncommonly involved. Boeck's sarcoid needs to be remembered in cases of splenomegaly of unknown origin, since other conspicuous signs of the disease may be absent. In several studies (5, 10, 13, 17), the spleen was described as clinically enlarged in about 25% of the cases. Oppenheim (16), on the other hand, found that splenic enlargement was rare.

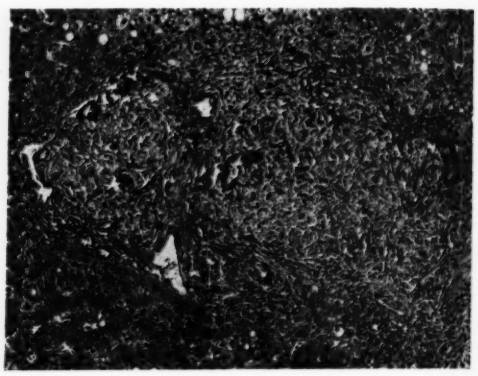

Fig. 6 (x115) Boeck's sarcoid of liver. Note ill-defined coalescent lesions at portal triad. See center for bile duct, vein and artery.

Endocrine symptoms, such as secondary eunuchism and diabetes insipidus, have been reported following invasion of the glands controlling these syndromes.

Invasion of the nervous system both in the spinal cord and in the brain may produce symptoms. One of Reisner's (17) cases which showed evidence of spinal cord damage later showed improvement.

Myocardial failure may be a result of direct muscle invasion or may be secondary to right heart strain from pulmonary involvement. Electrocardiographic changes in the P waves and P-R intervals have been described. Longcope (10) reported cardiac disease in five of his thirty-five cases.

The laboratory findings in about half of the cases reviewed show a mild leukopenia with

cosinophilia and a relative monocytic response. Anemia is uncommon. Bence-Jones protein, which is rare in sarcoidosis, is apparently found only where there is bone involvement. Serum protein elevations, which have been noted as high as 9.64 grams per cent, are chiefly the result of increased globulin, causing a reversal of the A : G ratio. Harrell (5) believed that the changes in serum globulin might be of prognostic significance, i.e., it would be elevated when the disease was active and lessened when there was healing. Reisner (17) noted no such relationship. Blood calcium has usually been found to be in the upper normal limits. Cholesterol is normal. Alkaline phosphatase has been found elevated in a significant number of cases (5). The Frei Test and serological studies are negative. The sedimentation rate is often increased even during the quiescent stages (17). A negative tuberculin skin test is found in sarcoid in greater proportion than in the average population, but anergy may be present in widespread tuberculosis with which Boeck's sarcoid may be occasionally confused.

Diagnosis is based upon clinical findings, such as parotid, eye, skin, and lymph node changes. Oppenheim and Pollack (16) maintain that a diagnosis can be made from the roentgenological appearance of the lungs alone, and so diagnosed fourteen of their forty-two cases. They claim that a relative absence of of respiratory symptoms with marked x-ray changes is a distinct help in diagnosis. Hodgkin's disease was the most difficult disease to differentiate from Boeck's sarcoid. In Hodgkin's disease, according to the criteria of Oppenheim and Pollack, splenic enlargement was found much more frequently. There was a different type of bone picture with more osteoblastic and osteolytic changes; and there were more frequent remissions and relapses with ultimate death. The similarity of sarcoid to leprosy and certain fungus diseases, as well as to systemic or pulmonary tuberculosis, must be remembered. The chronicity of Boeck's sarcoid and its usually benign clinical course aid in establishing a presumptive diagnosis. Tissue study provides the final and most accurate diagnostic criteria.

Therapy generally is symptomatic. However, gold, arsenicals, x-ray, fever therapy, leprosal, tuberculin, radium, ultra-violet light, and vitamin D in large doses have been used for general treatment. Oppenheim (16) felt that twenty-one of twenty-four patients received definite relief from roentgen therapy, which included radiation to the mediastinum and the peripheral lymph nodes. Other authors conclude that none of these treatments alter the course of the disease.

Prognosis depends upon the locations as well as the extent of the lesions. Spontaneous healing of varying degree does seem to occur in most cases, but the disease can progress fatally.

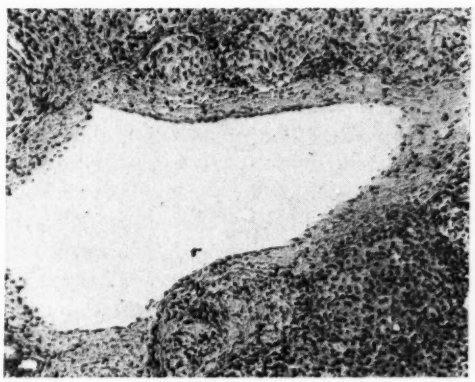

Fig. 7 (x115) Boeck's sarcoid of liver. Note lesion in wall of vein lower center; four bordering lesions right above.

Longcope (10) noted that patients are susceptible to tuberculosis or bronchopneumonia. Reisner (17), noted an increasing sensitivity to tuberculin preceding the development of tuberculosis. One case of Boeck's sarcoid (17) has been observed over a period of twenty-two years. Reisner's (17) five-year results in twenty-eight cases showed regression in nine, five remaining stationary, alternating progression and regression in five, and progression in nine. Seven of these were fatal. Five of the fatalities were due to tuberculosis. There is no known means of determining the course and outcome in individual cases.

Case Report

The patient, E.C. (M.H. 62286), a 26 year old, married, colored female was last admitted to the Memorial Hospital on November 24, 1947, and discharged March 20, 1948.

Summary of Past Medical History: The patient was first admitted on November 12,

1943, because of joint pains, shortness of breath on slight exertion, and weakness of three weeks' duration. Family history was non-contributory. She had had the usual childhood diseases—chicken-pox, measles, pertussis, and diphtheria—without any residual effects. Menses started at the age of nine years, occurring every thirty days. She denied any pregnancies. On examination, many small, shotty axillary lymph nodes were found measuring up to 1.0 cm. in diameter. Similar lymph nodes were noted in the epitrochlear, inguinal, and femoral regions measuring up to 2.0 cms. in diameter. The spleen extended to the level of the umbilicus; the liver was enlarged to 8.0 cms. below the right costal margin. The skin of her trunk and extremities revealed numerous pigmented, thickened pruritic areas. The presumptive clinical diagnosis made by Dr. John F. Hynes was Boeck's sarcoid. A flat plate of the abdomen revealed marked enlargement of the liver and spleen. Chest films disclosed diffuse extensive bilateral peri-bronchial infiltration, especially of both lower lobes with the greatest amount of involvement around the bronchial trunks and right lower lobe. No evidence of changes in the bones in the upper extremities was reported. Dr. B. M. Allen of the Radiology Department considered the roentgen findings compatible with a diagnosis of Boeck's sarcoid. On 11-15-43, biopsy of the axillary lymph nodes was performed and was reported as typical of sarcoidosis by Dr. Douglas M. Gay.*

Laboratory Studies: Kolmer, Kline, and Wassermann were negative; cephalin cholesterol flocculation 3 plus; RBC 4.0 M.; hemoglobin 12 grams; WBC 8,200, with a normal differential; urinalysis, negative. The patient was discharged from the hospital fourteen days after admission.

Following discharge, she was followed as an outpatient and treated in various ways, including a course of neoarsphenamine and intravenous gold therapy without any apparent effect.

In December, 1944, a maculopapular eruption with severe pruritis appeared on the skin of her abdomen. The consulting dermatologist, Dr. Allan D. King, described the lesions as numerous pea-sized, discrete, infiltrated nodules showing evidence of excoriation; recent pigmented plaques on the thighs; and a vague racemose erythema over the trunk and extremities. He concluded that the lesion was not typical of Boeck's sarcoid, but was compatible with that diagnosis. At approximately the same time, lesions were noted along the border of the eyelids, but were not further described by the examiner, nor were they noted again. No other ophthalmologic findings were noted.

During the interval between the first and second admissions, the patient noted the onset of amenorrhea unrelated to pregnancy. In June, 1945, progressive increase in the size of the abdomen was first noted, but not recognized as ascites until a later time. In June, 1946, the patient was admitted for the second time so that liver function studies could be performed and further treatment carried out. At this time, she was subject to recurrent bouts of diarrhea. Ascites, shortness of breath on exertion, and weakness of the lower extremities had increased during the previous year. Examination revealed rales throughout the right lung fields. Gallop rhythm with a pulse rate of 136 was noted. Blood pressure then was 128/92. No murmers were described. The spleen was enlarged to slightly below the umbilicus. The skin lesions, lymph nodes, and liver enlargement previously described were still present and unchanged. Chest films showed no significant change from prior films.

Laboratory studies at this time: Cephalin cholesterol flocculation 3 plus; total serum protein 8.37 grams; albumin 3.46 grams; globulin 4.91 grams; blood cholesterol 120 mgms%; bromsulfalein 25% retention in 5 minutes, no retention in 30 minutes; galactose tolerance: trace in first specimen; hippuric acid 61.5% excretion of a total dose of 3 grams. During this period of hospitalization, she was given mercurial diuretics in an attempt to alleviate the ascites. Excellent diuresis was attained, but little relief of ascites was noted. She was discharged July 14, 1946.

She returned to the out patient clinic weekly and received intravenous mercurials and at the same time took the drug regularly at home by mouth. The diuretics were partially successful in controlling the ascites. It was, however, observed that weakness in her lower

*Pathologist, St. Francis Hospital.

extremities was becoming more marked. The weakness was confined mostly to the flexors and extensors of the legs and feet. Neurologic examination revealed absent knee and ankle jerks. In March, 1947, a follow-up examination revealed hypertrophic lymphoid tissue in the pharynx. In addition, a soft systolic murmer was heard at the cardiac apex.

On May 27, 1947, she was admitted for the third time because of increasing ascites, which was apparently responsible in a large measure for her shortness of breath and weakness. Liver and spleen were palpated at the umbilical level. Moist rales were heard at both bases posteriorly, but no edema of the extremities was noted. There was no significant change in the status of the lymph nodes and skin lesions.

Laboratory findings at this time: RBC 4.22 M.; hemoglobin 12.5 grams; WBC 6,300 with a normal differential; prothrombin time 75% of normal; Kline negative; plasma proteins 7.83 grams with albumin 3.68 grams and globulin 4.15 grams; icteric index 9; cephalin cholesterol flocculation 4 plus; bromsulfalein 95% retention in 5 minutes, 2% in 30 minutes; galactose tolerance negative; tuberculin negative in all dilutions. Chest films revealed no significant change from prior films.

During this admission, Dr. Hynes suggested splenectomy to relieve the patient of the marked discomfort resulting from the splenomegaly.

In addition, spleno-renal venous anastomosis was proposed as a method to eliminate the ascites. However, this was not deemed feasible at the time and the patient was discharged July 12, 1947.

The weakness in the legs progressed following discharge from the hospital. The distress from the ascites and splenomegaly continued. Finally, at the suggestion of Dr. Lewis B. Flinn, the patient was readmitted to the Surgical Service for splenectomy.

Last admission: 11-24-47. Examination revealed a 26 year old colored female whose markedly protruding abdomen presented a marked contrast to her thin extremities, chest, and face. Skin lesions on trunk and extremities previously described were still present and unchanged. Blood pressure was 110/72, pulse 88, with normal sinus rhythm. Heart and lungs were clear to percussion and auscultation. Her weight was 135 lbs. and her girth 36 inches at the level of the umbilicus. The liver edge was palpated just above the umbilicus. The spleen extended to a point just below the left anterior superior iliac spine and medially to the midline. A complete neurologic examination revealed absent patellar reflexes bilaterally. In addition to marked weakness of the extensors of the thigh, the strength of the flexors, adductors, and abductors was was moderately decreased. Spinal fluid pressure and dynamics were normal, globulin negative; spinal fluid chemistry and cell count were within normal limits; culture and smear of the spinal fluid negative; spinal fluid Wassermann negative.

Pre-operative laboratory findings: RBC 3.4 M.; Hb. 12.5 grams; WBC 5000; polys 71%; lymphocytes 23%; monocytes 2%; eosinophiles 4%; coagulation time (capillary) 3 minutes 30 seconds; bleeding time 2 minutes 30 seconds; platelets 200,000; red blood cell fragility normal; prothrombin time 52% of control; urinalysis: specific gravity 1.021; routine and microscopic negative; serum protein 6.61 grams; albumin 2.75 grams; globulin 3.86 grams; A:G ratio 0.7/1; bromsulfalein 10% retention in 30 minutes, 5% retention in 60 minutes; urea clearance 113%; blood urea nitrogen 20 mgm%; cephalin cholesterol flocculation 4 plus; congo red negative; galactose tolerance test negative; PSP 30% in 20 minutes; sputum negative for acid-fast bacilli; urine negative for Bence-Jones protein.

Chest films revealed no significant change from previous examination (Figure 1). Biopsy of the skin lesions and lymph nodes showed sarcoidosis (Figs. 2 and 3).

The amenorrhea present since 1945 persisted. During the three weeks prior to operation, the patient was prepared by high protein, high carbohydrate and low fat diet with supplementary iron and vitamins. The anemia was corrected by transfusions of 1500 cc. fresh whole blood giving a final pre-operative hemoglobin determination of 16 grams. The prothrombin time was raised to 100% of control after five consecutive days of vitamin K therapy.

It was noted that the patient was slightly dyspneic even at rest. Definite cyanosis more

marked after the anemia was corrected, was present in the nailbeds.

On December 11, 1947, an operation was performed by one of us (R.A.M.) under continuous spinal anesthesia*. On opening the peritoneal cavity, 2750 cc. of clear yellow ascitic fluid was withdrawn. The spleen was found to extend below the left anterior superior iliac spine and medially to the midline. The liver was enlarged six fingers below the right costal margin. Firm and rubbery, it presented a somewhat hobnailed appearance. Through the capsule could be seen uniformly distributed areas of a reddish-brown substance. In addition, there were numerous large retroperitoneal lymph nodes measuring up to 3.0 cm. in diameter, particularly surrounding the coeliac axis. There was an accessory spleen measuring 5 cm. in diameter. The remainder of the intraperitoneal contents were apparently normal except for the atrophic uterus and ovaries.

Direct venous pressure readings in the subdivisions of the portal system showed a moderately advanced portal hypertension. In view of these findings and the ineffectiveness of splenectomy to reduce the ascites, it was decided that a shunting procedure was both feasible and advisable. Accordingly, an end-to-side spleno-renal venous anastomosis was performed following the removal of the spleen. The tail of the pancreas was partially resected to facilitate the procedure. During the eight and one-half hour operation, the patient received 5500 cc. of blood, and left the table with a blood pressure of 100/70 and a pulse of 110.

The postoperative course was complicated by dyspnea and cyanosis, requiring continuous oxygen therapy. Gaseous abdominal distention requiring gastric intubation and continuous drainage contributed to disturbances in electrolyte balance, necessitating extensive use of parenteral fluids and constant control by blood chemistry determinations. At one time, cardiac failure was apparent; digitalization was accomplished and continued for two weeks.

On the tenth postoperative day, the patient was on a soft, high protein diet. Subsequently, fever reappeared and in spite of massive dosages of penicillin and streptomycin, a left subdiaphragmatic abscess developed. On January 17, 1948, the abscess was drained. About 500 cc. of a thin semi-purulent fluid was removed. On culture, this material revealed staphylococcus aureus, B. coli and B. sublitis, all of which were resistant to penicillin and streptomycin in vitro. Following this procedure, the temperature returned to normal in twenty-four hours and the general condition improved. After a short interval, fever again appeared. This time a superficial wound infection was found and drained with an immediate fall in temperature to normal. General improvement ensued.

Elevations of the white count were so striking on several occasions during the postoperative period, that they warrant special attention. Before the drainage of this subphrenic abscess, counts as high as 27,250 with 90% polys were recorded, as would be expected. Immediately following drainage, the white count fell, but rose again before the superficial wound infection was drained reaching 50,000 with 62% polys and 35% lymphocytes. Again it fell following drainage. However, just before repair of the decubitus ulcer, the white count was elevated to 45,000 with 57% polys and 38% lymphocytes. Subsequently, it fell to 22,300 but has never attained the normal preoperative levels, despite her afebrile course and no apparent evidence of infection.

Unfortunately, due to the long period in bed, the patient developed a post-sacral decubitus necessitating repair by a sliding skin graft. This served to delay her discharge an additional thirty days.

At time of discharge from the hospital, March 20, 1948, the patient was remarkably improved. At no time since her operation has she exhibited any sign of ascites. She is afebrile; her dyspnea and cyanosis previously so marked have completely disappeared. Her appetite is ravenous and all her wounds are firmly healed. The liver edge remains palpable at the level of the umbilicus. Where once her muscular weakness made walking an effort, she now walks with less difficulty than previous to operation. Her weight is 110 lbs. and her girth is 27 inches.

Laboratory investigation prior to discharge

*Details and technique of the operative procedure are to be presented in a future publication.

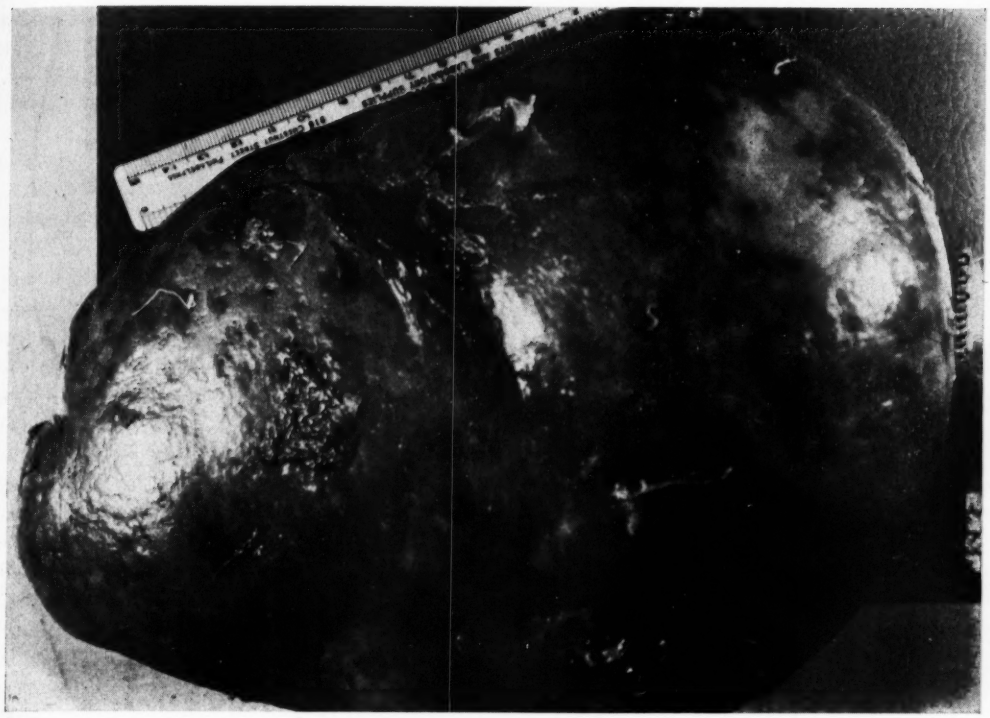

Fig. 8. External surface of spleen.

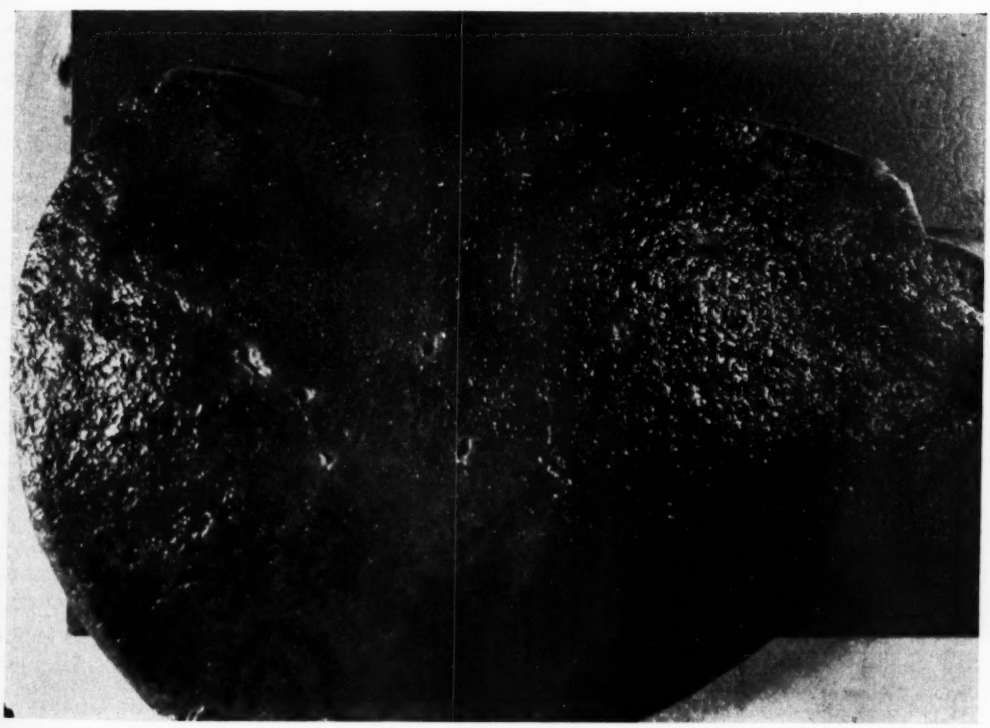

Fig. 9. A cut surface of spleen.

revealed the following: RBC 3.83 M.; Hb. 12.5 grams, 80%; color index 1.0; WBC 30,650; polys 29%; lymphocytes 68%; eosinophiles 3%; platelets 370,000; prothrombin time 100%; tuberculin test negative in all dilutions; urinalysis: specific gravity 1.026; routine and microscopic negative; urine negative for Bence-Jones protein; galactose tolerance negative; blood calcium 9.2 mgm%; serum alkaline phosphatase 16.5 Bodansky units; bromsulfalein 4% retention in 30 minutes, 0% in 60 minutes; sputum negative for acid-fast bacilli; serum protein 6.39 grams, albumin 2.45 grams, globulin 3.94 grams, A:G ratio .6/1; cephalin cholesterol flocculation 3 plus; spinal fluid negative.

An electrocardiogram showed P waves sharply peaked in Leads II and CR 2. The P-R interval was 0.20 second. These findings, as interpreted by Dr. Henry Claget, are consistent with chronic cor pulmonale and do not indicate intrinsic myocardial injury.

In the case described above, tissue from the skin lesions, the inguinal and peri-aortic lymph nodes, accessory spleen, spleen, liver, pancreas, and bone marrow were made available for microscopic study.

As may be seen in the accompanying photomicrographs, the lesions of Boeck's sarcoid were best defined in the lymph nodes (Figs. 3 and 4), but nevertheless quite definite in the skin (Fig. 2), liver (Figs. 6 and 7), and splenic tissue (Fig. 5). A sternal marrow trephine biopsy (6 mm. in diameter) taken on March 5, 1948, showed no sarcoid lesions. The marrow did, however, display a moderately intense myeloid hyperplasia, which may well have been provoked by the presence of sarcoid lesions in the marrow, even though the one small sample studied did not show any definite lesions.

Langhan's giant cells were not present in the lymph nodes examined but were seen in the splenic, hepatic, and dermal lesions. Occasional asteroid bodies were noted within the giant cells seen in the spleen. Special stains for acid fast bacilli in all of the tissues sectioned were uniformly negative. No venous intimal lesions, which allegedly accounted for rupture of the spleen in a previously alluded to case (7), were encountered in the spleen. The lesions in the spleen were extensive and displayed degenerative changes of the epithelioid cells making up the lesions. These were surrounded by partially necrotic, partially hyalinized and regenerative fibrous connective tissue.

The typical lesions of sarcoid were quite numerous in the liver biopsy and were located primarily around the tributaries of the portal vein at many of the portal triads (Fig. 6). They were also seen occasionally around the central veins of the liver lobule. The wall of several of the larger veins (possibly sublobulars) showed infiltration with the typical lesion of sarcoid (Fig. 7). This phenomenon has been described before by James and Wilson (7) as occurring in the walls of the smaller splenic veins. We have not seen it described by other authors as occurring in the walls of the hepatic veins. Unlike the lesions described in the splenic veins, these were not associated with focal hemorrhage. It is perhaps remarkable that hemorrhage did not occur, for the intimal surface of the vein is almost ruptured as will be seen in (Fig. 7).

Ascites, in association with Boeck's sarcoid is a rarely reported complication (11, 17), even in those cases in which the lesions have been noted in the liver. In one patient, reported by Reisner (17), there was peritoneal effusion and pleural effusion which he felt was caused by infiltration of these serous membranes with sarcoid. Because of the marked hepatomegaly observed clinically in our case and the extensive involvement of the liver tissue around the tributaries of the portal vein as described histologically, we feel that these lesions resulted in a marked obstruction to venous blood flow in the portal tributaries and were the chief factor in the production of the ascites, particularly an ascites which was present despite a hyperproteinemia.

Grossly, the spleen (Fig. 8 and 9), was noteworthy in that is measured 28.0 x 18.5 x 12.0 cm. and weighed 2250 grams. The diaphragmatic surface of its capsule showed scattered fibrinous adhesions and focal areas of hyalo-capsulitis. On section, its parenchyma was rusty brown, rubbery to firm, and uniformly sprinkled with reddish brown minute granular areas.

In so far as we are aware from our study of the literature, this is apparently the largest

spleen recorded in a case of Boeck's sarcoid. Mallory (12) and others (1, 8, 9, 18) have reported and recalled cases in which the spleen weighed as much as 1740 grams.

Summary and Conclusion

1. A review of Boeck's sarcoid as a systemic disease has been presented.

2. A case manifesting evidence of sarcoidosis involving the skin, lymph nodes, lungs, spleen, liver, and pancreas with presumptive, but not proven, involvement of the heart, spinal cord, and bone marrow is described.

3. From our review of the literature, we find this case to be most unusual, not only because of its widespread systemic involvement, but also because of the massive hepatomegaly with ascites and the enormous splenomegaly.

4. Gratifying symptomatic relief of ascites, dyspnea, and abdominal discomfort was afforded the patient by splenectomy and splenorenal venous anastomosis.

5. We are fully aware that in slowly progressive cases of Boeck's sarcoid similar to the one herein described, the prognosis must still remain guarded despite the present improvement.

We wish to acknowledge the untiring efforts and the whole-hearted cooperation of all the personnel of the nursing, medical, surgical, radiology, and laboratory departments of the Memorial Hospital. Without this cooperation the successful outcome in this case might not have been possible. We are indebted to Mr. Chester King of the Memorial Hospital Radiology Department and to Mr. John Dick of the Delaware Hospital Laboratory for the photographs included herein. We greatly appreciate the editorial assistance of Mrs. David Baltz.

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DIVERTICULA ARISING AT THE PHARYNGOESOPHAGEAL JUNCTION*

(Discussion of the Disease and Presentation of an Unusual Case)

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Our knowledge (1) concerning formation of diverticula at the pharyngoesophageal junction is not newly acquired. In 1764, Ludlow, an English anatomist, described "preternatural pockets" in the esophagus which he had seen at the autopsy table. In 1816, John Bell, a Scotch surgeon, described the same condition in a patient and presented an etiologic concept which is still popular today. He believed that because of a poorly coordinated swallowing mechanism, the pharynx becomes distended and herniates through the hypertrophied bundles of the inferior constrictor pharyngis muscle. This places pharyngoesophageal diverticula among the pulsion type of diverticula in contrast to the traction type that occurs elsewhere in the esophagus, particularly in the intrathoracic segment.

The condition has been likened to inguinal hernia, in that a definite sac composed of pharyngeal mucosa and submucosa protrudes through a point of congenital weakness between the lower transverse fibres of the inferior constrictor pharyngis and the cricopharyngeus muscles. The pulsion force required may arise when the strongly contrac-

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ting constrictor pharyngeus muscles fail to coordinate with the cricopharyngeal muscle which is slow to relax. This allows intrapharyngeal pressure to rise, so that the mucosa and submucosa may gradually herniate through a point of congenital muscle weakness.

Recently[2] doubt has been cast on the theory that there is a congenital muscle weakness at the point of protrusion of the sac. Rather, it is believed that an acquired pressure atrophy may be produced at this location because of the close relation between the lower border of the cricoid and a prominent ridge at the fifth cervical intervertebral junction. The mortar-pestle action of these two bony points on the intervening structures then result in thinning of the muscles forming the posterior pharyngeal wall. This can then serve as the point of origin of a pharyngoesophageal diverticulum.

Pharyngoesophageal diverticula have been receiving increasing attention in the surgical literature. Undoubtedly the reason for this lies in a more widespread awareness of the disease and improved roentgen methods permitting its earlier recognition. However, we feel that a report of the following case is well justified because the diverticulum described is of unusually large size. Inevitably its surgical treatment presented interesting and unique problems.

CASE REPORT

The patient, H.J. (M.H. 725240), a 52 year old Negro male, was admitted to the Memorial Hospital October 10, 1947, because of inability to swallow food and extreme malnutrition.

Approximately six months prior to admission the patient began to regurgitate a portion of each meal. At first he noticed that only a small amount of solid food could be retained, while his ability to swallow fluids was unimpaired if they were taken slowly. At the same time a sensation of pressure in his chest following meals and audible gurgling sounds were experienced which he interpreted as arising deep in his chest. The regurgitation of his food necessitated many attempts to swallow so that he could satisfy his hunger. Despite the tremendous effort required, he existed in this fashion until five weeks prior to admission, when his weight loss and weakness became so marked that he sought medical attention. He consulted the referring physician who noticed by fluroscopy a mass in his chest. Subsequent chest films led to the diagnosis of esophageal diverticulum, although the true site of origin was not suspected. The patient was told that surgery would be required. Unfortunately he remained unconvinced, and it was not until over a month later that he presented himself for admission. At this time he was unable to retain even a small amount of the food he attempted to swallow. At the time of his admission his weight had gone from 130 lbs. to 94 lbs. in five weeks.

Physical examination: At the time of the initial examination, the patient was a markedly malnourished and emaciated Negro male. His blood pressure was 116/84, pulse 80, and respiration 20. Except for numerous palpablely enlarged anterior and posterior cervical lymph nodes, the head and neck were essentially negative. Examination of the chest revealed widening of the upper mediastinal dullness to the right and diminution of breath sounds in this area. Excluding the associated signs of malnutrition, there were no other significant physical findings.

Laboratory: RBC 4.15 million, Hb 13.5 grams—80%, WBC 22,300, polys 82%, lymphs 14%, monocytes 4%. The urinalysis: negative.

His complete inability to retain food was not fully appreciated until revealed by roentgen films. These depicted a large ovoid mass in the right mediastinum. It contained both air and fluid. Swallowed barium entered the structure and outlined a large sac 9cm in both transverse and anterior-posterior diameters extending from the first thoracic to the lower border of the sixth thoracic vertebrae. (Figs. 1 and 2). The right lung was compressed by the diverticulum. On emptying the contents of the sac by lavage, it failed to collapse. This was taken as an indication that the structures surrounding the diverticulum were rigid. None of the swallowed barium entered the distal esophagus. Evidence of old healed tuberculosis was found at the apices. In addition, biopsy of the calcified cervical lymphnodes revealed quiescent tuberculosis. Despite the latter findings, Drs. B. M. Allen and Paul A. Shaw of the Radiology Department, believed that the most likely diagnosis compatible with such esophageal deformity was diverticulum arising at the pharyngoesophageal junction.

Supporting evidence was provided by esophagoscopy, (which was performed by Drs. W. M. Pierson and Robert Hazzard.) The instrument entered directly into the blind sac, the lowest limit of which was 28 cms. from the level of the upper incisors. No distal esophageal lumen could be seen.

Blood chemistry done at this time revealed a blood urea nitrogen 52, plasma chlorides 428, serum proteins 7.9. This was interpreted as severe dehydration.

Because of weight loss amounting to 10 lbs. during the first five days of hospitalization and inability to pass a feeding tube, a Witzel type jejunostomy was done under local anesthesia. The procedure was well tolerated and proved effective. During the next three weeks he gained 26 lbs. on jejunostomy feedings. The blood urea nitrogen, in the meanwhile, fell to 18, serum proteins to 6.0 grams. He also received 1500 cc. of fresh whole blood during this period.

On October 13, 1947, five weeks after admission, mobilization and exteriorization of the diverticulum was done by one of us (R.A.M.) under endotracheal nitrous oxide, oxygen, and ether anesthesia. The entire procedure was performed through a lateral neck incision; the diverticulum was observed to extend into the mediastinum to the dimensions noted by x-ray. Upon recovery from anesthesia, the patient was immediately ambulated and showed little reaction to the procedure.

In the ten days intervening between the two stages of the operation, the patient gained 9 lbs. On October 23, 1947, the old wound was reopened, the diverticulum freed and excised. Once more, there was little reaction to this procedure and the patient was ambulated on the same day.

Ten days after the second operation, he was started on increasing amounts of fluids by mouth. At no time was there interferenee with swallowing. Soon afterward he was placed on a soft diet, which he took with ease.

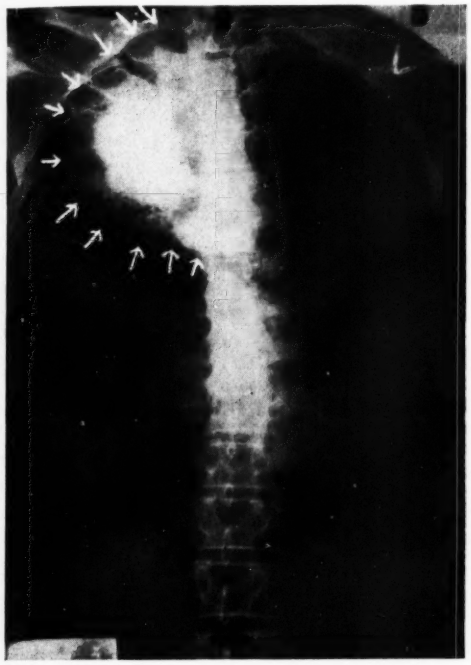

Fig. 1. September 9, 1947. A large diverticulum filling the mediastium and compressing the right upper lobe is outlined. In this film only a small amount of barium has been allowed to enter the diverticulum. The limits of the sac are shown by the arrows. No barium is seen in the distal esophagus.

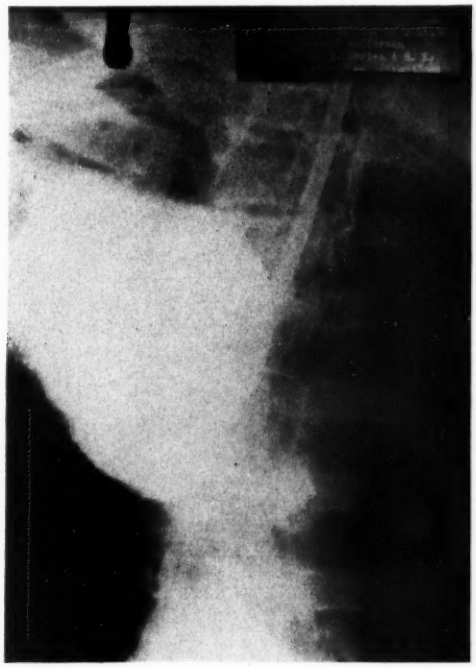

Fig. 2. September 9, 1947. Levine tube enters the diverticulum but consistently fails to enter the esophagus. The lower half of the diverticulum is filled with barium, and air occupies the upper half. Again, no barium entered the distal esophagus.

On November 24, he was discharged to his home, where he has continued on a full diet.

He has been followed in Out-patient Clinic since discharge. In the middle of February, 1948, chest films and barium swallow (Fig. 3) revealed normal function of the esophagus and no evidence of recurrence of the diverticulum or stricture formation. At his last visit, on March 6, 1948, the patient was entirely asymptomatic and weighed 147 lbs.

COMMENT

The symptoms of pharyngoesophageal diverticulum depend on the size of the sac at the time and the concomitant distortion of the esophagus. Early, when a shallow niche is present in the posterior pharyngoesophageal wall, food particles may be caught on the shelf so formed with resultant coughing and discomfort to the patient. As the sac enlarges, both food and air may be contained in it. Disconcerting sounds may be produced from this combination and also regurgitation of ingested food can occur. With enlargement of the sac, all grades of esophageal obstruction can occur up to a point where no food whatever can pass to the stomach. An excellent illustration of this tragic turn of events has been given in the case described. Lahey (3) points out that as the sac enlarges, it takes a position so that its orifice lies transversely, while the true distal esophageal orifice lies laterally, being closed to a narrow slit by the downward traction exerted by the diverticulum. It is to be noted in our case that the esophageal orifice could not be seen through an esophagoscope, while the instrument passed readily into the diverticulum. This procedure is not without danger of perforation and resultant mediastinitis. The examination must be done only by the most skilled observers, exercising extreme precautions. Physical findings are usually lacking, although occasional cases have been reported in which it has been possible to palpate the sac in the neck. It is important in the operative procedure to determine which side of the neck the sac has descended. Harrington (4) found in his series that 83% descended on the left side of the neck.

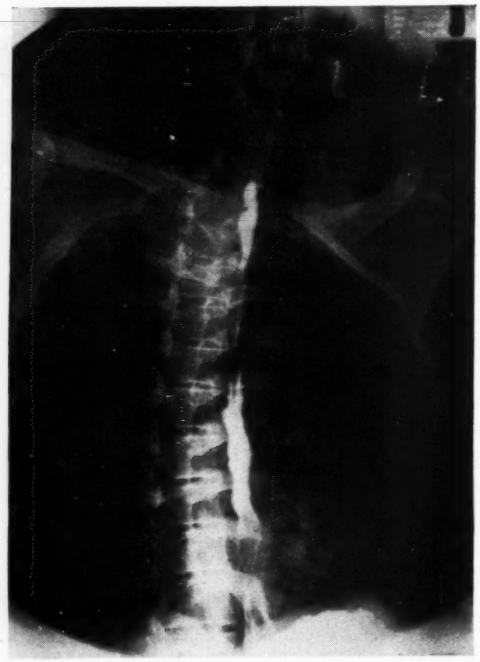

Fig. 3. February, 1948. At fluoroscopy, barium swallow shows normal function without evidence of recurrence of diverticulum or stricture. Barium enters the distal esophagus readily.

Although the history alone is frequently sufficient for diagnosis, x-ray and barium studies provide essential information as to size and location of the sac. In addition, the x-rays will reveal the early annoying defects.

In the case we have reported the rapid weight loss, even while hospitalized, along with the inability to pass a feeding tube, made the nutritional problem acute. The underlying cause was of necessity relegated to the background, while a jejunostomy was performed. To satisfy caloric and protein demands quickly and adequately made this a life saving procedure.

Except in the early stages before the sac has acquired a definite neck, the only treatment is surgical. At the present time, it is agreed that total excision of the sac and closure of the resultant esophageal defect is the goal to be attained. The major differences center about the choice of the one stage or the two stage procedure. It cannot be denied that Harrington (4), Sweet (5), and others (6, 7, 8) by the use of careful surgical technique have achieved excellent results with the one stage procedure. On the other hand, Lahey (3) with the larger series of cases and equally excellent results, adheres to the two stage pro-

cedure. He feels that the period between operations allows closure of the fascial planes of the neck. This acts as a barrier to the entrance of infection into the neck and mediastinum, a danger inherent in the one stage procedure. In our own case, the defect remaining in the mediastinum following immobilization of the diverticulum, even though temporary, dictated conservatism. For this reason the two stage procedure was carried out. (9)

Grateful acknowledgement is given to Mr. Chester King of the Radiology Department for his excellent photography and to Mrs. David Baltz for her helpful editing of this paper.

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Recent Increase in Heart Disease In Women May Be From Smoking

Smoking may have something to do with the higher incidence of coronary thrombosis among women in the past 30 years, according to an article appearing in the current issue of *Hygeia*, the health magazine of the American Medical Association.

"Four groups of one thousand patients each (smokers, nonsmokers, coronary thrombosis and non-thrombosis) were subjected to statistical analysis. On the average smokers were found to get coronary thrombosis 10 years earlier than nonsmokers. Although not a cause of the disease, smoking is considered by many heart specialists to be a factor," the author, Irene E. Soehren, Dallas, Ore., states.

In coronary thrombosis a clot forms in one of the coronary arteries, and a portion of the heart muscle is deprived of blood for a length of time sufficient to do damage.

"Probably as many as one man in 30 and one woman in 90 over 40 years of age will suffer an attack of coronary thrombosis this year. Thousands of men and women who have had coronary thrombosis may reasonably expect to live many more years and lead comparatively normal, useful lives. Rest and reassurance are two of the most important forms of treatment.

"The fifth day is the most worrisome," Miss Soehren continues. "All the area of the heart supplied by the closed artery and its branches is incapacitated. Hemorrhage and death of the tissue take place. The height of softness in this area is reached the fifth day, when it is most subject to rupture. If rupture occurs, the internal bleeding is nearly always fatal.

"But if the patient gets past the first week, one can breathe easier. Complete healing takes six or eight weeks. The muscle deprived of blood no longer contracts. It dies, and scar tissue forms. Healing of the injured area has been effected, but the heart's efficiency is reduced in proportion to the extent of the muscle damage.

"Many patients go back to so nearly normal that one cannot tell they have had a coronary attack," the writer asserts.

As life expectancy increases, more people than ever will die of coronary heart disease. "But through the use of the new anticoagulant drugs, heparin and dicumarol, more and more will survive the first attack.

"Today coronary thrombosis is not a death sentence."

Delaware Medical Technologists

The Delaware Society of Laboratory Technicians and Medical Technologists invites the medical profession to attend its first Seminar, on May 22, in the Delaware Hospital Auditorium. The program is as follows:

Dr. R. Philip Custer, Pathologist and Director of the Laboratory, Presbyterian Hospital, Philadelphia. "The Laboratory and Longevity."

Dr. Ruth Wichelhausen, Bacteriologist, Arthric Research Unit, Veterans Administration, Washington, D. C. "The Cultivation of Brucella from Clinical Materials."

Dr. W. G. Sawitz, Assistant Professor of Parasitology and Etimology, Jefferson Medi-

cal Alumni Society, at the University of Penn-Parasitology.

Dr. John J. McGraw, Assistant Director of the Laboratory, Bryn Mawr Hospital. "Technical Aspects of Blood Transfusions."

Dr. J. G. Reinhold, Director of the Department of Biochemistry, Philadelphia General Hospital. "Recent Advances in Chemical Technology in the Hospital Laboratory."

Army Medical Museum, Washington, D. C. "Demonstration of the Celloidin Technique of Embedding Tissues."

Those attending the Seminar are invited to be luncheon guests of the Delaware Hospital. Reservation cards for the luncheon will be ready later. There is no registration fee. We anticipate a very interesting day.

Southern Surgical Association Approves Use of Nurse Anesthetists

At the recent meeting of the Southern Surgical Association, which was held in Hollywood, Florida, December 9, 10 and 11, 1947, the following resolution was passed unanimously by the Association:

"Although the Southern Surgical Association has been and always will be extremely interested in the advancement of all medical sciences, and particularly in anesthesia because of complete dependence on safe anesthesia for the safe performance of a surgical procedure, it, the Southern Surgical Association, heartily disapproves of the publicity given by certain newspapers and popular lay magazines to the statement sponsored by a group of anesthesiologists who are seeking to discredit the well trained nurse anesthetist and to compel surgeons to operate only if anesthetics are administered by physician-anesthetists.

"This attempt to persuade the public that there is a grave danger in a surgical operation if the anesthetist is not a certified medical specialist is already decreasing the number of efficient well-trained nurse anesthetists and forcing surgeons to perform recently developed complicated operations with anesthetics administered by young hospital interns or general practitioners, neither of whom have special training or experience in the administration of an anesthetic."

American College of Surgeons Approves Use of Nurse Anesthetists

The Board of Regents of the American College of Surgeons, at a meeting on February 22, adopted a resolution commending the services of nurses who have had special training in the administration of anesthesia and recommending the continuance of training courses in this field for nurses. The resolution reads as follows:

The American College of Surgeons regards with deep concern the actions of some physician anesthesiologists in giving the impression to the laity in the public press that it is unsafe for experienced nurse anesthetists to conduct surgical anesthesia. While it supports the increasing tendency of having physician anesthesiologists in charge of surgical anesthesia, it deplores at this time any propaganda for the elimination of the trained nurse anesthetist. On the contrary, the American College of Surgeons is of the opinion that, in view of the inadequacy in number of the physician anesthesiologists and in view of the splendid record of achievement of the nurse anesthetists, institutions engaged in the training of nurses for this purpose should be encouraged to continue their programs.

U. of Pa.

University of Pennsylvania Medical Alumni will hold a dinner at the convention of the American Medical Association in Chicago, Wednesday, June 23, 1948, at the Lake Shore Club, 850 Lake Shore Drive. On arrival in Chicago, alumni should contact Miss Frances R. Houston, Executive Secretary of the Medical Alumni Society, at the University of Pennsylvania registration booth.

Some families who have had tuberculous patients at home have been most helpful in aiding other families to accept care, hospitalization and detailed rehabilitation plans. They have been very helpful in the community in pointing up, through their own experiences, the reasons why the community was not meeting effectively the needs of its tuberculous families. Tuberculosis can become a very expensive affair both in money and human lives to a community which does not have an adequate tuberculosis program. Margaret S. Taylor, R.N., Conf. on Rehab. of the Tuberculous, Mar. 4, 1946.

+ Editorial +

DELAWARE STATE MEDICAL JOURNAL

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Subscription price: $4.00 per annum, in advance. Single copies, 50 cents. Foreign countries: $5.00 per annum.

Vol. 20 April, 1948 No. 4

The Job of the County Medical Society

"The County Medical Society in many areas has become just another society." This statement by Dr. Louis Bauer (A. M. A. trustee and president of the Medical Society of the State of New York) is an alarming truth. Medicine has become over-organized. Surgical societies, obstetrical societies, pediatric societies, general practice societies, and others have sprung up everywhere. In many places this movement has reduced the interest in county society activities, has lowered attendance at society meetings, and has diminished the influence of the county medical society in the community.

Today the influence of the county medical society is needed more than ever before. The individual physician must be kept united and informed; the public must be educated as to the problems of medicine, both scientific and economic; and liaison must be maintained with lay groups and organizations in the community. These are functions of the county medical society.

What are the responsibilities of a county medical society? The county medical society has a responsibility to the public, a responsibility to its membership, and a responsibility to medical organization. There is no order of preference; all are equally important. One cannot survive without the other two.

The first step toward understanding within the membership is to succeed in an understanding among the county medical society officers.

The Third National Conference of County Medical Society Officers, scheduled for June, is designed to assist in this step as well as to arrive at a measure of agreement in regard to the meaning and extent of such responsibilities. Every county medical society has been issued an invitation to send its officers to the conference. Each officer attending will be free to enter into the discussion and to express his thoughts and ideas on the job of the county medical society.

The thoughts and ideas expressed will be correlated and forwarded to the president or secretary of each county society and from there on it will be up to them, and to every committee member, and to every society member, to give attention to the problem.

The county medical society is as effective or as ineffective as its success in carrying on its responsibilities. Such success depends on the individual physicians who make up each society.

The strength of a chain is the strength of its weakest link. Don't have any weak links in your society.

A. M. A. *News Letter,* April 8, 1948.

MISCELLANEOUS

Army Doctors Say Mass Hysteria Need Not Follow Atomic Bomb Explosion

If an atom bomb should fall on an American city, the population would be faced with the greatest emergency in its history. But, it is by no means true that the entire population would be wiped out, nor is it true that nothing could be done to help the survivors, according to Army Medical Corps officers who are conducting continuous study of the problem.

There is no presently known method of protecting those in the immediate neighborhood of an atomic bomb when it explodes. Nevertheless, since the Los Alamos experiment opened the Atomic Age, a great deal has been learned about mitigating the secondary effects of ionizing radiation and about protecting survivors who have received less than a lethal dose.

Many lives may be saved by widespread knowledge of therapeutic measures among physicians, and many more by a general understanding of preventive measures which can be taken by the general population.

In a talk made at the Pennsylvania University Hospital, Philadelphia, Col. James P. Cooney of the Army Medical Corps stressed the question of civilian morale. "Mr. and Mrs. America have been so frightened by the information they have received to date, that if a bomb were dropped on one of our cities tomorrow, mass hysteria would probably cause the unnecessary loss of many lives," Colonel Cooney said. "Mr. and Mrs. America have always been ready and willing to do what must be done in an emergency, and will, if properly instructed beforehand, do the right thing under this new kind of stress."

The real difference between ordinary high explosives and atom bombs is the enormous amount of radiant energy produced by the latter—energy covering the whole range of wave lengths from heat waves to million-volt gamma waves.

The radiant energy may be divided into two types: ionizing and non-ionizing. The most important type of injury noted in Hiroshima and Nagasaki was, of course, that due to the ionizing component of the radiant energy from the bomb. Four known kinds of penetrating radiation can be expected within the immediate area of the blast. They are:

First, gamma radiation, which is essentially the same as x-ray. In an atom bomb explosion, however, these are 200,000,000 volt x-rays. They are lethal to anyone within roughly a mile of the blast, do serious damage to those as close as a mile-and-a-half, but their range is limited to approximately two miles. They move with the speed of light and most of them are produced at the instant of explosion.

Second, neutron beams, streams of heavy atomic particles shoot out in all directions within a millionth of a second of the explosion. They have slightly less range than gamma rays. Both gamma rays and neutron beams passing through matter such as blood, bone or flesh, produce extensive ionization of the atoms which make up body cells, which results in the breakdown of chemical bonds, causing profound alterations in cellular function. The fact that some kinds of cells, such as certain types of cancer cells, are affected more easily than others is the basis of radiation therapy. Whatever damage is done in this way is instantaneous, although observable symptoms may not appear for some time.

Neutron beams, however, have another effect, new in medical science. Neutrons are captured in elements contained in human cells, producing new elements which are themselves radioactive, and may remain so for a long time.

Third, are beta rays, streams of electrons which rarely penetrate the skin and whose effects will be found chiefly on the surface; and,

Fourth, are alpha particles, the nucleii of helium atoms, which do not get through the cornified, or horny tissue, layer of the skin. Because of their low penetrating power, it is not likely that either the beta rays or the alpha particles resulting directly from the explosion will cause fatal injury.

It must be admitted, Army doctors say, that there is not much even a medical man can do about the immediate radiation from an atom bomb explosion. But in such an eventuality the immediate requirement will be for rescue work on a large scale and treatment for fractures, contusions, lacerations and burns. Here

physicians and laymen will be on familiar ground. These kinds of injuries are the same whether produced by an atom bomb or a block buster; they involve no new principles.

Also, some aid may be given to victims of many sorts of secondary radiation dust spread by the explosion, radioactivity caused by neutron captured by atoms, or radioactive spray if the bomb is dropped in water. Against this secondary radiation, various safeguards can be provided, and it is essential that physicians be trained in safety measures. Army, Navy and Atomic Energy Commission scientists, as well as civilians interested in radiation therapy, are hard at work on the problem and substantial progress is being made. One important line of research is in the efficacy of blood transfusions, since it has been established that one of the most serious effects of radiation is damage to the blood-forming elements such as the bone marrow. A person tided over until normal function is resumed may be saved.

A major function of the physician after such a disaster would be to act as public health officer. Most food in the affected area would not be unfit for consumption, but it would all have to be surveyed before it could safely be eaten. All the water in the region would probably contain radio-active isotopes, slow poison to anyone drinking it, but research is in progress on methods of removing radio-active substances. Obviously the usual boiling or chlorination would be useless. There is some indication that filtration and other methods can be developed.

Physicians would have a heavy responsibility in supervising the decontamination of not only food and water but of refugees, by means of complete change of clothing, bathing, etc. This requires familiarity with the use of detecting instruments such as the Geiger counter, and a knowledge of the kinds of persistent radiation to be expected. (People escaping from the area where a bomb has exploded may find their wearing apparel sufficiently radio-active to constitute a menace to others.) This problem has already come up in hospitals where patients are being treated with large amounts of radio-active material.

Armed Forces medical officers face an even greater responsibility than do civilian physicians, since it may be necessary to send troops into a bombed area either for rescue work or on tactical operations. A series of intensive courses on the medical aspects of atomic explosion was instituted last May at the Army Medical Center, Washington, D. C. Nearly 700 doctors and scientists have been trained there in the fundamentals of radiation hazards, diagnosis and treatment. More than 50 medical schools throughout the country have sent representatives, many of whom are now setting up similar courses in their respective institutions.

Following the bombing of Hiroshima and Nagasaki, much was learned of what symptoms to expect, overt and latent, immediate and delayed. All the results will not be in for years, of course. Great publicity has been given to the possibility of gene mutations which might produce a high percentage of abnormal offspring in generations to come. However, Dr. Shields Warren, Assistant Professor of Pathology at the Harvard Medical School, recently told Army doctors attending the current basic science course at the Army Medical Center, Washington, D. C., that aberrations in the genes and ova of mammals produced by irradiation are usually lethal to the developing embryo, and consequently the result of such irradiation would probably be a higher rate of abortion and miscarriage rather than production of a race of monsters pictured in sensational prophecies.

Besides flash burns from enveloping hot gases, such as result from any powerful explosion, blisters similar to skin burns and sunburn are likely to appear on the skin of atom bomb victims. In Japan, burns and blisters appear to follow a definite pattern, showing up within five minutes on those close to the explosion. At nearly a mile away, they did not show for several hours, and at greater distances, up to about two miles, the appearance of burns and blisters was even longer delayed.

Of the superficial effects perhaps the most alarming is the falling out of the hair. While bound to cause a bad psychological effect, it is due to superficial radiation and is not serious in itself. The hair will return if the patient has not received a lethal dose of radiation.

Immediately after a bomb blast those in the vicinity who escape immediate death from shock, burns or falling debris may appear to have suffered no ill effects at first. But within a few hours, victims seriously affected will feel nauseated and start to vomit. This may pass in a day or so. But at the beginning of about the second week when the hair starts to fall out, the feeling of general malaise, experienced in the first few hours, may return accompanied by fever. There is likely to be bloody diarrhea. Examination will show that the white blood count has fallen to a very low level. Death may come very quickly, or there may be anemia and general debility over a long period with eventual recovery.

Physicians must be prepared to expect such a syndrome and to take nothing for granted about the condition of the patient during the first few days.

There is a parallel in our experience with heavy bombing of cities from the air in World War II. This type of warfare was an innovation, and at first physicians had virtually no information concerning the effect of shock waves of that magnitude on the human body. Scores of people in the neighborhood of bursting bombs died, although they had apparently suffered no injuries. The knowledge of what could be done to save those people was acquired the hard way because medical science had not foreseen such a problem.

The threat of the atom bomb is at least now recognized and we have already a growing body of knowledge which can be mastered while an emergency is still remote.

Surgery Relieves Some Types Of Severe One-Sided Headache

Surgical treatment should be considered for persistent and severe one-sided headaches after drugs or other conservative measures have failed to bring relief, according to Walter G. Haynes Jr., M. D., Birmingham, Ala., writing in the February 21 issue of *The Journal of the American Medical Association.*

Dr. Haynes reports that 87 per cent of the 47 patients to whom he has given such treatment have received lasting relief. Conservative treatment afforded relief in only 32 per cent of 25 other cases.

The pure migraine headache is not the type for which he recommends surgery, although the symptoms often resemble those of migraine. He classifies his patients' headaches as follows:

1. Severe pain in which the blood vessels in one of the temples are constricted.

2. Pain that travels up over a nerve in the back of the skull, then along the arteries of one of the temples and the arteries close to the temple, on the inside of the skull.

3. Inflammation of the nerve roots in the neck due to mechanical pressure on a nerve in the back of the skull.

Dr. Haynes believes that all three types of headache are caused by sympathetic pain fibers accompanying the artery which starts at about the level of the neck and gives off many branches to the face and skull. (The areas of pain described are covered by these branches.)

Surgical treatment consists of cutting out a part of the offending arterial branches or, in the third type of headache, removing part of the sensitive nerve in the back of the skull. The sympathetic pain fibers are thus kept divided.

"Neither of these procedures is hazardous," Dr. Haynes writes, "and in trained hands they do not constitute any danger to the patient's life or allow any untoward sequelae. There have not been any fatalities in this series."

Issue Postage Stamp Commemorating A.M.A. Centennial, June 9

Postmaster General Robert E. Hannegan has approved the issuance of a commemorative postage stamp honoring the doctors of America.

The special stamp will be of the three-cent variety and will be placed on sale on June 9 on the occasion of the 100th anniversary of the founding of the American Medical Association.

"In so honoring the American doctor," Mr. Hannegan said, "we are paying tribute to the men and women of medicine who devote their lives to the cause of humanity. Alleviation of pain and suffering and the betterment of mankind is their creed. The contribution which they have made to our national life is one of which all Americans can be proud and grateful."

Details as to the place of sale and description of the stamp will be announced later.